



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/851,970	05/10/2001	Seiji Umemoto	Q64435	4097

65565 7590 01/25/2008
SUGHRUE-265550
2100 PENNSYLVANIA AVE. NW
WASHINGTON, DC 20037-3213

EXAMINER

RUDE, TIMOTHY L

ART UNIT	PAPER NUMBER
----------	--------------

2871

MAIL DATE	DELIVERY MODE
-----------	---------------

01/25/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

09/851,970

Applicant(s)

UMEMOTO ET AL.

Examiner

Timothy L. Rude

Art Unit

2871

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 October 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-44 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 31 October 2007 has been entered.

Claims

Claims 1, 20, 21, and 40 are amended.

Double Patenting

1. Claims 1 and 20 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-8 of copending Application No. 09/898,060. Although the conflicting claims are not identical, they are not patentably distinct from each other because the patentably distinct features pertain to the use of a transparent adhesive layer between a light guide or transparent

substrate and a display panel that allows the light in said light guide or said transparent substrate to experience total internal reflection rather than passing into the display at shallow angles. Also, structures are used opposite said adhesive layer to direct light into the display at steep angles.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim 1 is provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-22 of copending Application No. 09/878,268. Although the conflicting claims are not identical, they are not patentably distinct from each other because the patentably distinct features pertain to the use of a transparent adhesive layer between a light guide or transparent substrate and a display panel that allows the light in said light guide or said transparent substrate to experience total internal reflection rather than passing into the display at shallow angles. Also, structures are used opposite said adhesive layer to direct light into the display at steep angles.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim 1 is provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-38 of copending Application No. 10/225,532. Although the conflicting claims are not identical,

Art Unit: 2871

they are not patentably distinct from each other because the patentably distinct features pertain to the use of a transparent adhesive layer between a light guide or transparent substrate and a display panel that allows the light in said light guide or said transparent substrate to experience total internal reflection rather than passing into the display at shallow angles. Also, structures are used opposite said adhesive layer to direct light into the display at steep angles.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

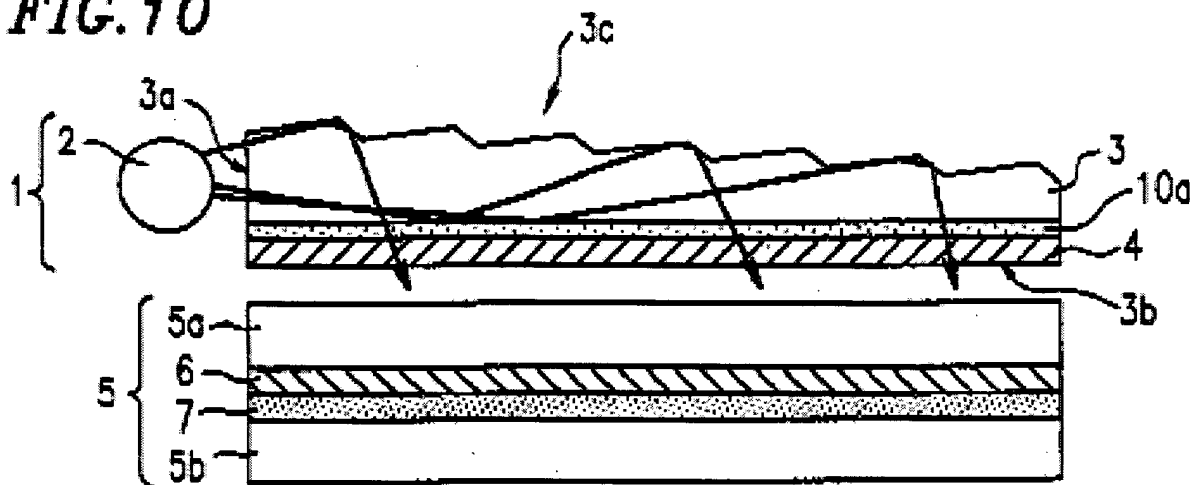
2. Claims 1-8, 12-14, 20-28, 32-34, and 40-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masuda et al (Masuda) USPAT 6,340,999 B1, in view of Egawa et al (Egawa) USPAT 6,295,104 B1.

As to claims 1, 20-21, and 40-44 Masuda discloses in Embodiment 3, Figure 10, (col. 15, line 25 through col. 18, line 16) a reflection type liquid-crystal display device comprising:

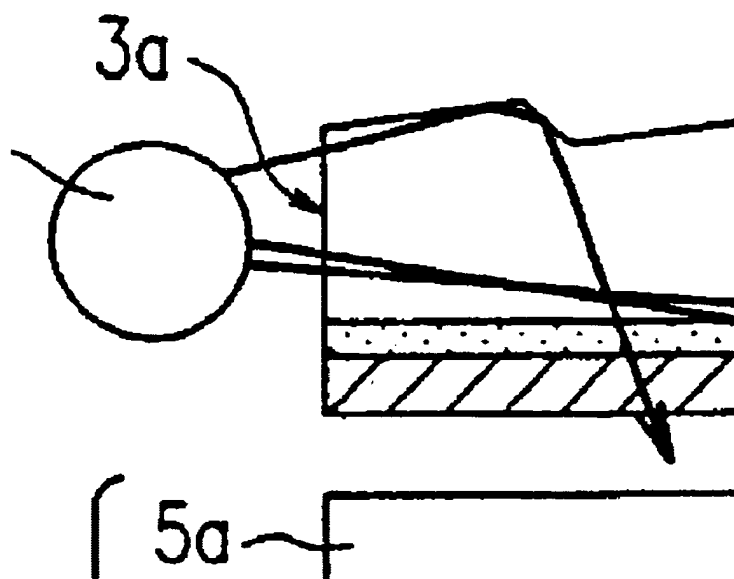
a reflection type liquid-crystal display panel, 5, including a liquid-crystal cell and a reflector, 7, said liquid-crystal cell having a visual-side substrate, 5a, a back-side substrate, 5b, and a liquid crystal, 6, said visual-side substrate including a light guide, 3 (Applicant's transparent substrate and/or transparent layer), a low-refractive resin layer, 10a (Applicant's transparent layer lower in reflective index) (1.38, col. 15, lines 35-39) than the transparent substrate (1.49, col. 15, lines 35-39), and a transparent electrode (not shown),

Please note, limitations result in a multi-layer visual-side substrate comprising *inter alia* a lower layer/substrate, 5a, and an upper layer/substrate, 3. said back-side substrate, 5b, having an electrode (not shown), said liquid crystal being held between said visual-side and back-side substrates so that respective electrode sides of said visual-side and back-side substrates are disposed opposite to each other, said reflector being disposed on the back-side substrate side (per Figure 10);

FIG. 10



at least one illuminator, 2, disposed on one of side surfaces of said reflection type liquid-crystal display panel and entirely below the optical path control layer having a repetitive structure of optical path changing slopes, 3c, on an outer side of said visual-side substrate and being higher in refractive index (1.49, col. 15, lines 35-39) than said low-refractive-index transparent layer, each of said optical path changing slopes being inclined at an inclination angle in a range of from 35 to 48 degrees with respect to a reference plane of said visual-side substrate [as graphically illustrated by the light path arrow in the upper portion of Figure 10 below], wherein an incident light from said illuminator is transmitted to said optical path control layer through said visual-side substrate [3a of 3, upper layer of multi-layer visual-side substrate].



Masuda does not explicitly disclose an optical path control layer having a repetitive structure of optical path changing slopes, on an outer side of said visual-side substrate that is distinct or not integral to the transparent substrate. However, making integral or making separable the parts of the visual-side substrate are species not considered patentably distinct [MPEP 2144.01 - 2144.05]. It would have been obvious to one having ordinary skill in the art at the time the invention was made to comprise the claimed structure of the visual-side substrate as an art-recognized species suitable for the intended purpose of forming a transparent substrate (MPEP 2144.07).

Masuda does not explicitly teach in the text that his angle of slopes illustrated in Figure 10 are within the range of 35 to 48 degrees.

Egawa teaches the use of [col. 8, lines 28-33] angle of slope (alpha) in the range of 46 to 52 degrees from vertical [equates to 38 to 44 degrees from Applicant's

reference plane of the visual side substrate which overlaps Applicant's claimed range of 35 to 48 degrees] to improve contrast and eliminate unwanted moiré pattern for improved display performance [Abstract].

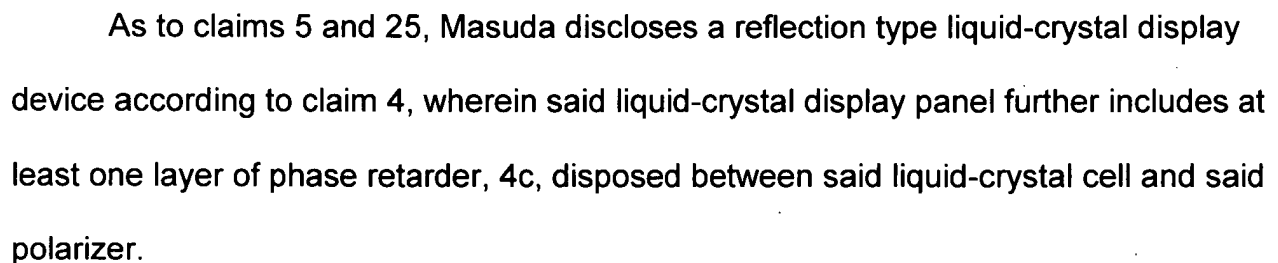
Egawa is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add an angle of slope of 38 to 44 degrees to improve contrast and eliminate unwanted moiré pattern for improved display performance.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Masuda with the angle of slope of 38 to 44 degrees to improve contrast and eliminate unwanted moiré pattern for improved display performance.

As to claims 2 and 22, Masuda discloses a reflection type liquid-crystal display device according to claim 1, wherein said low-refractive-index transparent layer is disposed between said transparent substrate and said transparent electrode, and there is a difference in refractive index by $(1.49 - 1.38) = 0.11$ (Applicant's 0.05 or more) between said transparent layer and said transparent substrate (col. 15, lines 35-39).

As to claims 3 and 23, Masuda discloses a reflection type liquid-crystal display device according to claim 1, wherein at least said visual-side substrate in said liquid-crystal cell is made of polymethylmethacrylate (refractive index 1.49, col. 15, lines 35-39) (Applicant's optically isotropic material).

FIG. 2



As to claims 6 and 26, Masuda discloses a reflection type liquid-crystal display device according to claim 1, wherein: said optical path control layer is constituted by a

repetitive structure of prism-like structures, 3f; and each of said optical path changing slopes in said optical path control layer faces said illuminator, 2 (see also Figure 10).

As to claims 7 and 27, Masuda discloses a reflection type liquid-crystal display device according to claim 6, wherein each of said prism-like structures in said optical path control layer is constituted by a concave portion shaped substantially like a triangle in section (Figure 10).

As to claims 8 and 28, Masuda discloses a reflection type liquid-crystal display device according to claim 7, wherein each of said prism-like concave portions is constituted by a continuous groove which extends from one end to the other end of said optical path control layer in a ridgeline direction parallel with or inclined to said side surface of said liquid-crystal display panel on which said illuminator is disposed (Figure 2).

As to claims 12 and 32, Masuda discloses a reflection type liquid-crystal display device according to claim 6, wherein each of said prism-like structures in said optical path control layer is constituted by a concave or convex portion shaped, in section, substantially like a triangle or quadrangle having at least two optical path changing slopes facing said illuminators (Figure 10).

As to claims 13, 14, 33, and 34, Masuda discloses a reflection type liquid-crystal display device according to claim 12 wherein said inclination angle of each of said optical path changing slopes in said optical path control layer is in a range of from 38 to 45 degrees, except wherein said illuminators are disposed on at least two of side surfaces of said liquid-crystal display panel.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to duplicate said illuminator so that illuminators are disposed on at least two of side surfaces of said liquid-crystal display panel since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art.

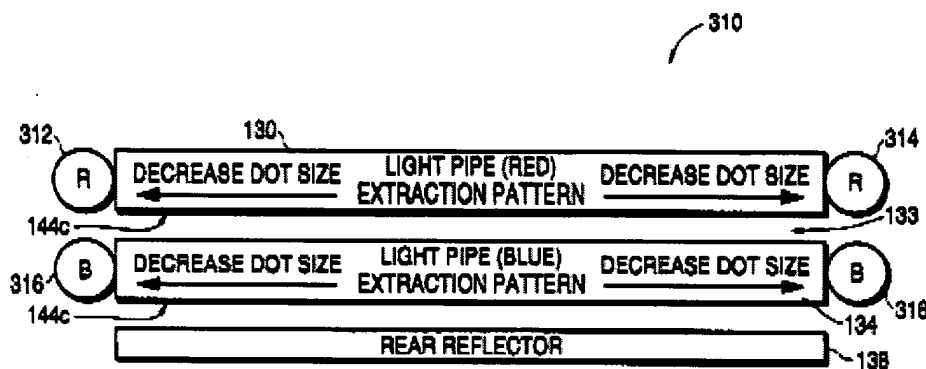
3. Claims 13, 14, 33, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masuda in view of Egawa, as applied to claims 1 and 7 above, in view of Evanicky et al (Evanicky) USPAT 6,243,068 B1.

As to claims 13, 14, 33, and 34, Masuda in view of Egawa discloses a reflection type liquid-crystal display device according to claim 12, wherein said inclination angle of each of said optical path changing slopes in said optical path control layer is in a range of from 38 to 45 degrees.

Masuda in view of Egawa do not explicitly disclose illuminators disposed on at least two of side surfaces of said liquid-crystal display panel.

Art Unit: 2871

Evanicky teaches the use of illuminators disposed on at least two of the side surfaces to provide greater brightness [col. 16, lines 37-46].

**FIG. 10A**

Evanicky is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add illuminators disposed on at least two of the side surfaces to provide greater brightness.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Masuda in view of Egawa with the illuminators disposed on at least two of the side surfaces of Evanicky to provide greater brightness.

4. Claims 9-11, 15-17, 29-31, and 35-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masuda in view of Egawa, as applied to claims 1 and 7 above, in view of Yano et al (Yano) Japanese Patent Abstract Publication 11-326903.

As to claims 9-11 and 29-31, Masuda in view of Egawa discloses a reflection type liquid-crystal display device according to claims 7 and 27.

Masuda in view of Egawa does not explicitly disclose a device wherein said prism-like concave portions are constituted by discontinuous grooves each having a length not smaller than 5 times as large as a depth of said groove.

Yano teaches that the grooves may be formed parallel to the light source and continuously or as a prism-like irregularity formed as a series of heights or crevices where the ridgeline continued and may be formed in the direction of a ridgeline which has a predetermined interval and was arranged discontinuously as intermittent heights or a crevice [0044] and Drawings 1-4.

Yano is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add prism-like concave portions are constituted by discontinuous grooves each having a length not smaller than 5 times as large as a depth of said groove.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Masuda in view of Egawa with the prism-like concave portions are constituted by discontinuous grooves each having a length not smaller than 5 times as large as a depth of said groove of

Yano since it has been held that discovering an optimum value of a results effective variable involves only routine skill in the art.

As to claims 15-17 and 35-37, Masuda in view of Egawa discloses a reflection type liquid-crystal display device according to claims 1 and 21.

Masuda in view of Egawa does not explicitly disclose a device wherein said optical path control layer is made of a transparent sheet, and is bonded to said liquid-crystal display panel through an adhesive layer having a refractive index higher than that of said low refractive index transparent layer, wherein said adhesive layer is constituted by a tacky layer, and wherein each of the refractive index of said optical path control layer and the refractive index of said adhesive layer is higher by 0.05 or more than that of said low-refractive-index transparent layer.

Yano teaches the use of transparent glue (Applicant's tacky adhesive layer) having a refractive index of 1.40-1.55 which would result in the refractive index of said adhesive layer being higher by at least $(1.40 - 1.38) = 0.12$ (Applicant's 0.05 or more) than that of said low-refractive-index transparent layer to provide a bright display with only low-power light [0053].

Yano is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to use a device wherein said optical path control layer is made of a transparent sheet, and is bonded to said liquid-crystal display panel through an adhesive layer having a refractive index higher than that of said low refractive index transparent layer, wherein said adhesive layer is constituted by a tacky

layer, and wherein each of the refractive index of said optical path control layer and the refractive index of said adhesive layer is higher by 0.05 or more than that of said low-refractive-index transparent layer to provide a bright display with only low-power light.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Masuda in view of Egawa wherein said optical path control layer is made of a transparent sheet, and is bonded to said liquid-crystal display panel through an adhesive layer having a refractive index higher than that of said low refractive index transparent layer, wherein said adhesive layer is constituted by a tacky layer, and wherein each of the refractive index of said optical path control layer and the refractive index of said adhesive layer is higher by 0.05 or more than that of said low-refractive-index transparent layer of Yano to provide a bright display with only low-power light.

5. Claims 18, 19, 38, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masuda in view of Egawa, as applied to claim 1 above, in view of Nemoto et al (Nemoto) USPAT 6,456,344 B1.

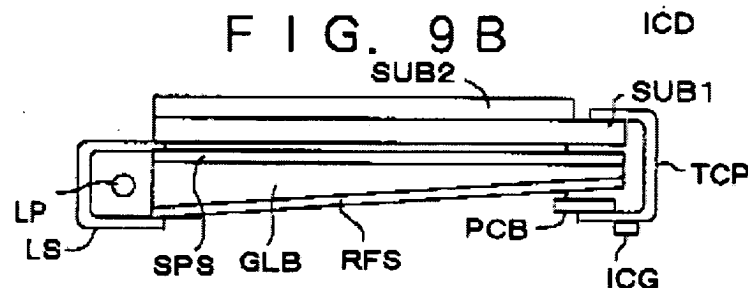
As to claims 18, 19, 38, and 39, Masuda in view of Egawa discloses a reflection type liquid-crystal display device according to claims 1 and 21.

Masuda in view of Egawa does not explicitly disclose a device wherein: at least one side surface of said visual-side substrate is protruded outward from that of said

Art Unit: 2871

back-side substrate; and each illuminator is disposed on said protruded side surface of said visual-side substrate, and wherein each illuminator is disposed and held on said side surface of said visual-side substrate in such a manner that said illuminator is enclosed by a reflection type light source holder and end portions of said light source holder are bonded to end portions of upper and lower surfaces of said visual-side substrate.

Nemoto teaches in Figure 9B the use of a protruded side surface with a light source holder, LS, bonded to end portions of upper and lower surfaces of transparent substrate, GLB, to comprise a lighted display assembly (col. 7, lines 27-32).



Nemoto is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add at least one side surface of said visual-side substrate is protruded outward from that of said back-side substrate; and each illuminator is disposed on said protruded side surface of said visual-side substrate, and

Art Unit: 2871

wherein each illuminator is disposed and held on said side surface of said visual-side substrate in such a manner that said illuminator is enclosed by a reflection type light source holder and end portions of said light source holder are bonded to end portions of upper and lower surfaces of said visual-side substrate to comprise a lighted display.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Masuda in view of Egawa with the at least one side surface of said visual-side substrate is protruded outward from that of said back-side substrate; and each illuminator is disposed on said protruded side surface of said visual-side substrate, and wherein each illuminator is disposed and held on said side surface of said visual-side substrate in such a manner that said illuminator is enclosed by a reflection type light source holder and end portions of said light source holder are bonded to end portions of upper and lower surfaces of said visual-side substrate as an art-recognized means suitable for the intended purpose of comprising a lighted display (MPEP 2144.07).

6. Claims 1-8, 12-14, 20-28, 32-34, and 40-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masuda et al (Masuda) USPAT 6,340,999 B1, in view of Yang et al (Yang) USPAT 6,323,919 B1, and further in view of Egawa et al (Egawa) USPAT 6,295,104 B1.

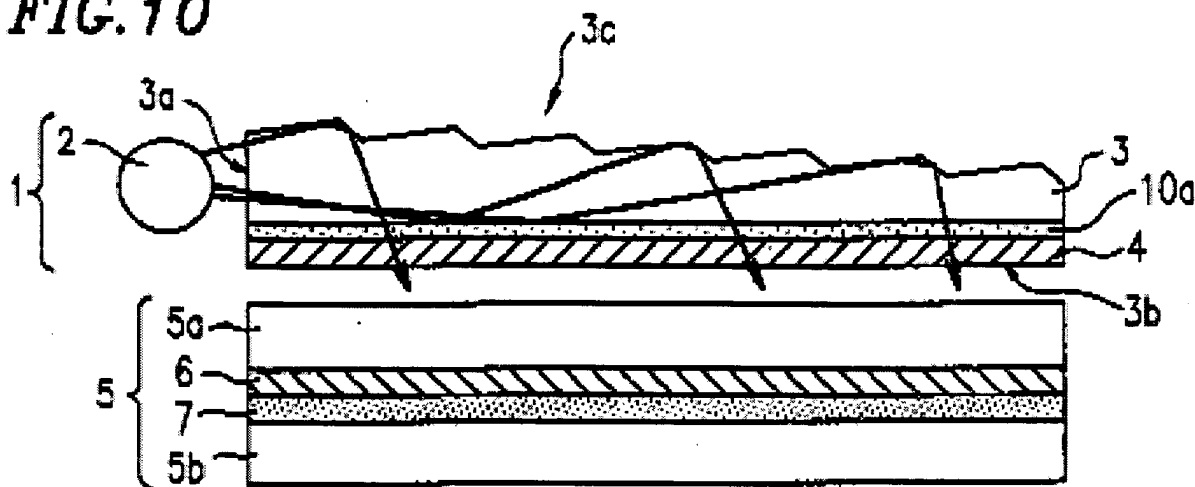
As to claims 1, 20-21, and 40-44 Masuda discloses in Embodiment 3, Figure 10, (col. 15, line 25 through col. 18, line 16) a reflection type liquid-crystal display device comprising:

a reflection type liquid-crystal display panel, 5, including a liquid-crystal cell and a reflector, 7, said liquid-crystal cell having a visual-side substrate, 5a, a back-side substrate, 5b, and a liquid crystal, 6, said visual-side substrate including a light guide, 3 (Applicant's transparent substrate and/or transparent layer), a low-refractive resin layer, 10a (Applicant's transparent layer lower in reflective index) (1.38, col. 15, lines 35-39) than the transparent substrate (1.49, col. 15, lines 35-39), and a transparent electrode (not shown),

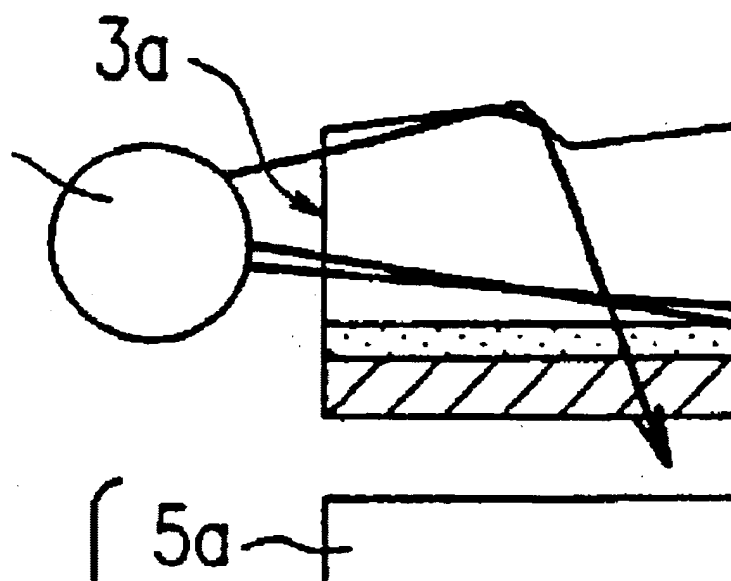
Please note, limitations result in a multi-layer visual-side substrate comprising *inter alia* a lower layer/substrate, 5a, and an upper layer/substrate, 3.

said back-side substrate, 5b, having an electrode (not shown), said liquid crystal being held between said visual-side and back-side substrates so that respective electrode sides of said visual-side and back-side substrates are disposed opposite to each other, said reflector being disposed on the back-side substrate side (per Figure 10);

FIG. 10



at least one illuminator, 2, disposed on one of side surfaces of said reflection type liquid-crystal display panel and entirely below the optical path control layer having a repetitive structure of optical path changing slopes, 3c, on an outer side of said visual-side substrate and being higher in refractive index (1.49, col. 15, lines 35-39) than said low-refractive-index transparent layer, each of said optical path changing slopes being inclined at an inclination angle in a range of from 35 to 48 degrees with respect to a reference plane of said visual-side substrate [as graphically illustrated by the light path arrow in the upper portion of Figure 10 below], wherein an incident light from said illuminator is transmitted to said optical path control layer through said visual-side substrate [3a of 3, upper layer of multi-layer visual-side substrate].

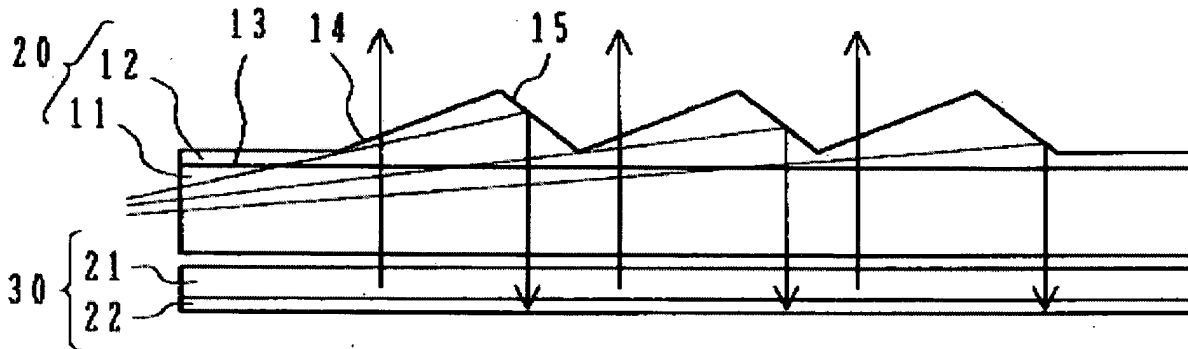


Masuda does not explicitly disclose 1) an optical path control layer having a repetitive structure of optical path changing slopes, on an outer side of said visual-side substrate that is distinct or not integral to the transparent substrate, and Masuda does not explicitly disclose 2) in the text that his angle of slopes illustrated in Figure 10 are within the range of 35 to 48 degrees.

Yang teaches 1) an optical path control layer, 12, having a repetitive structure of optical path changing slopes, on an outer side of said visual-side substrate, 11, that is distinct or not integral to the transparent substrate in Figure 1B [col. 4, lines 12-45] as an art-recognized means suitable for the intended purpose of providing a repetitive structure on the front surface of a transparent substrate portion of a visual-side substrate [MPEP 2144.07]. Please note this is not patentably distinct from transparent substrate that is integrated with the repetitive structures (integrated with an optical path

control layer). Please note that there is no functional difference regardless of the presence or absence of the interface at 13 [please see straight ray-traces in Figure 1B].

FIG.1B



Yang is evidence that workers of ordinary skill in the art would find the reason, suggestion, or motivation to add an optical path control layer, 12, having a repetitive structure of optical path changing slopes, on an outer side of said visual-side substrate, 11, that is distinct or not integral to the transparent substrate in Figure 1B [col. 4, lines 12-45] as an art-recognized means suitable for the intended purpose of providing a repetitive structure on the front surface of a transparent substrate portion of a visual-side substrate [MPEP 2144.07].

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of Masuda with an optical path control layer, 12, having a repetitive structure of optical path changing slopes, on an outer side of said visual-side substrate, 11, that is distinct or not integral to the transparent substrate in Figure 1B [col. 4, lines 12-45] as an art-recognized alternate

Art Unit: 2871

means suitable for the intended purpose of providing a repetitive structure on the front surface of a transparent substrate portion of a visual-side substrate [MPEP 2144.07].

Egawa teaches 2) the use of [col. 8, lines 28-33] angle of slope (α) in the range of 46 to 52 degrees from vertical [equates to 38 to 44 degrees from Applicant's reference plane of the visual side substrate which overlaps Applicant's claimed range of 35 to 48 degrees] to improve contrast and eliminate unwanted moiré pattern for improved display performance [Abstract].

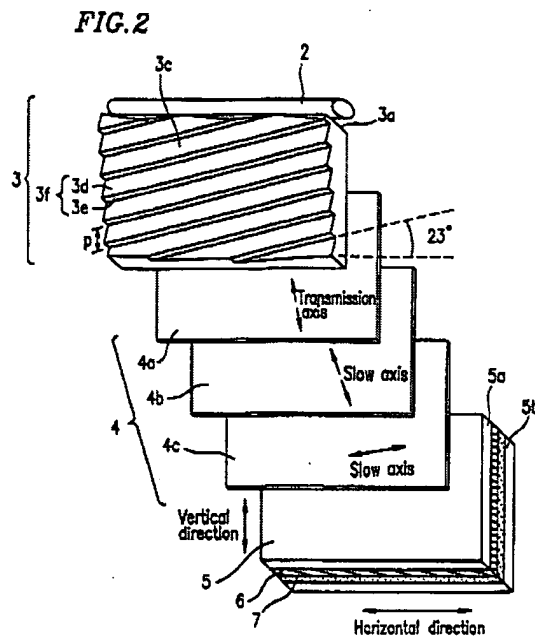
Egawa is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add an angle of slope of 38 to 44 degrees to improve contrast and eliminate unwanted moiré pattern for improved display performance.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Masuda with the angle of slope of 38 to 44 degrees to improve contrast and eliminate unwanted moiré pattern for improved display performance.

As to claims 2 and 22, Masuda discloses a reflection type liquid-crystal display device according to claim 1, wherein said low-refractive-index transparent layer is disposed between said transparent substrate and said transparent electrode, and there is a difference in refractive index by $(1.49 - 1.38) = 0.11$ (Applicant's 0.05 or more) between said transparent layer and said transparent substrate (col. 15, lines 35-39).

As to claims 3 and 23, Masuda discloses a reflection type liquid-crystal display device according to claim 1, wherein at least said visual-side substrate in said liquid-crystal cell is made of polymethylmethacrylate (refractive index 1.49, col. 15, lines 35-39) (Applicant's optically isotropic material).

As to claims 4 and 24, Masuda discloses a reflection type liquid-crystal display device according to claim 1, wherein said liquid-crystal display panel further includes one polarizer, 4a, disposed on one side of said liquid-crystal cell (col. 15, line 27-30).



As to claims 5 and 25, Masuda discloses a reflection type liquid-crystal display device according to claim 4, wherein said liquid-crystal display panel further includes at

least one layer of phase retarder, 4c, disposed between said liquid-crystal cell and said polarizer.

As to claims 6 and 26, Masuda discloses a reflection type liquid-crystal display device according to claim 1, wherein: said optical path control layer is constituted by a repetitive structure of prism-like structures, 3f; and each of said optical path changing slopes in said optical path control layer faces said illuminator, 2 (see also Figure 10).

As to claims 7 and 27, Masuda discloses a reflection type liquid-crystal display device according to claim 6, wherein each of said prism-like structures in said optical path control layer is constituted by a concave portion shaped substantially like a triangle in section (Figure 10).

As to claims 8 and 28, Masuda discloses a reflection type liquid-crystal display device according to claim 7, wherein each of said prism-like concave portions is constituted by a continuous groove which extends from one end to the other end of said optical path control layer in a ridgeline direction parallel with or inclined to said side surface of said liquid-crystal display panel on which said illuminator is disposed (Figure 2).

As to claims 12 and 32, Masuda discloses a reflection type liquid-crystal display device according to claim 6, wherein each of said prism-like structures in said optical

Art Unit: 2871

path control layer is constituted by a concave or convex portion shaped, in section, substantially like a triangle or quadrangle having at least two optical path changing slopes facing said illuminators (Figure 10).

As to claims 13, 14, 33, and 34, Masuda discloses a reflection type liquid-crystal display device according to claim 12 wherein said inclination angle of each of said optical path changing slopes in said optical path control layer is in a range of from 38 to 45 degrees, except wherein said illuminators are disposed on at least two of side surfaces of said liquid-crystal display panel.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to duplicate said illuminator so that illuminators are disposed on at least two of side surfaces of said liquid-crystal display panel since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art.

7. Claims 13, 14, 33, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masuda in view of Yang and Egawa, as applied to claims 1 and 7 above, in view of Evanicky et al (Evanicky) USPAT 6,243,068 B1.

As to claims 13, 14, 33, and 34, Masuda in view of Yang and Egawa discloses a reflection type liquid-crystal display device according to claim 12, wherein said

inclination angle of each of said optical path changing slopes in said optical path control layer is in a range of from 38 to 45 degrees.

Masuda in view of Egawa do not explicitly disclose illuminators disposed on at least two of side surfaces of said liquid-crystal display panel.

Evanicky teaches the use of illuminators disposed on at least two of the side surfaces to provide greater brightness [col. 16, lines 37-46].

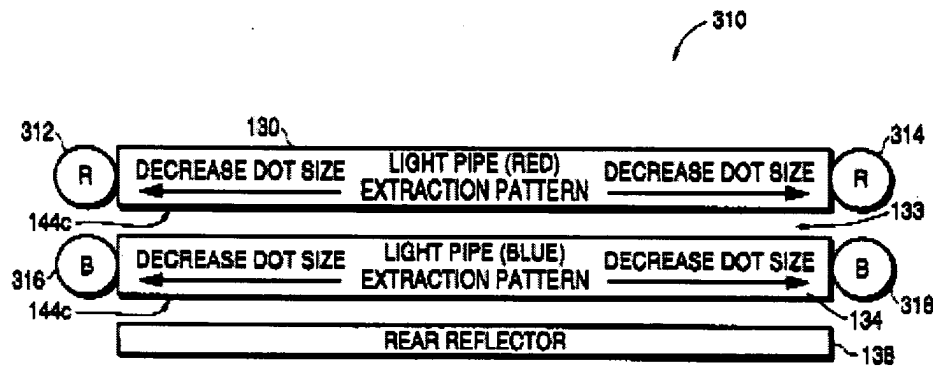


FIG. 10A

Evanicky is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add illuminators disposed on at least two of the side surfaces to provide greater brightness.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Masuda in view

of Egawa with the illuminators disposed on at least two of the side surfaces of Evanicky to provide greater brightness.

8. Claims 9-11, 15-17, 29-31, and 35-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masuda in view of Yang and Egawa, as applied to claims 1 and 7 above, in view of Yano et al (Yano) Japanese Patent Abstract Publication 11-326903.

As to claims 9-11 and 29-31, Masuda in view of Yang and Egawa discloses a reflection type liquid-crystal display device according to claims 7 and 27.

Masuda in view of Egawa does not explicitly disclose a device wherein said prism-like concave portions are constituted by discontinuous grooves each having a length not smaller than 5 times as large as a depth of said groove.

Yano teaches that the grooves may be formed parallel to the light source and continuously or as a prism-like irregularity formed as a series of heights or crevices where the ridgeline continued and may be formed in the direction of a ridgeline which has a predetermined interval and was arranged discontinuously as intermittent heights or a crevice [0044] and Drawings 1-4.

Yano is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add prism-like concave portions are constituted by

Art Unit: 2871

discontinuous grooves each having a length not smaller than 5 times as large as a depth of said groove.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Masuda in view of Egawa with the prism-like concave portions are constituted by discontinuous grooves each having a length not smaller than 5 times as large as a depth of said groove of Yano since it has been held that discovering an optimum value of a results effective variable involves only routine skill in the art.

As to claims 15-17 and 35-37, Masuda in view of Egawa discloses a reflection type liquid-crystal display device according to claims 1 and 21.

Masuda in view of Egawa does not explicitly disclose a device wherein said optical path control layer is made of a transparent sheet, and is bonded to said liquid-crystal display panel through an adhesive layer having a refractive index higher than that of said low refractive index transparent layer, wherein said adhesive layer is constituted by a tacky layer, and wherein each of the refractive index of said optical path control layer and the refractive index of said adhesive layer is higher by 0.05 or more than that of said low-refractive-index transparent layer.

Yano teaches the use of transparent glue (Applicant's tacky adhesive layer) having a refractive index of 1.40-1.55 which would result in the refractive index of said adhesive layer being higher by at least $(1.40-1.38) = 0.12$ (Applicant's 0.05 or more)

Art Unit: 2871

than that of said low-refractive-index transparent layer to provide a bright display with only low-power light [0053].

Yano is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to use a device wherein said optical path control layer is made of a transparent sheet, and is bonded to said liquid-crystal display panel through an adhesive layer having a refractive index higher than that of said low refractive index transparent layer, wherein said adhesive layer is constituted by a tacky layer, and wherein each of the refractive index of said optical path control layer and the refractive index of said adhesive layer is higher by 0.05 or more than that of said low-refractive-index transparent layer to provide a bright display with only low-power light.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Masuda in view of Egawa wherein said optical path control layer is made of a transparent sheet, and is bonded to said liquid-crystal display panel through an adhesive layer having a refractive index higher than that of said low refractive index transparent layer, wherein said adhesive layer is constituted by a tacky layer, and wherein each of the refractive index of said optical path control layer and the refractive index of said adhesive layer is higher by 0.05 or more than that of said low-refractive-index transparent layer of Yano to provide a bright display with only low-power light.

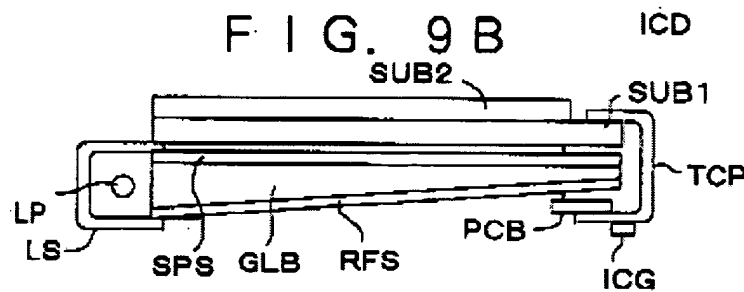
Art Unit: 2871

9. Claims 18, 19, 38, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masuda in view of Yang and Egawa, as applied to claim 1 above, in view of Nemoto et al (Nemoto) USPAT 6,456,344 B1.

As to claims 18, 19, 38, and 39, Masuda in view of Yang and Egawa discloses a reflection type liquid-crystal display device according to claims 1 and 21.

Masuda in view of Egawa does not explicitly disclose a device wherein: at least one side surface of said visual-side substrate is protruded outward from that of said back-side substrate; and each illuminator is disposed on said protruded side surface of said visual-side substrate, and wherein each illuminator is disposed and held on said side surface of said visual-side substrate in such a manner that said illuminator is enclosed by a reflection type light source holder and end portions of said light source holder are bonded to end portions of upper and lower surfaces of said visual-side substrate.

Nemoto teaches in Figure 9B the use of a protruded side surface with a light source holder, LS, bonded to end portions of upper and lower surfaces of transparent substrate, GLB, to comprise a lighted display assembly (col. 7, lines 27-32).



Nemoto is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add at least one side surface of said visual-side substrate is protruded outward from that of said back-side substrate; and each illuminator is disposed on said protruded side surface of said visual-side substrate, and wherein each illuminator is disposed and held on said side surface of said visual-side substrate in such a manner that said illuminator is enclosed by a reflection type light source holder and end portions of said light source holder are bonded to end portions of upper and lower surfaces of said visual-side substrate to comprise a lighted display.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Masuda in view of Egawa with the at least one side surface of said visual-side substrate is protruded outward from that of said back-side substrate; and each illuminator is disposed on said protruded side surface of said visual-side substrate, and wherein each illuminator is disposed and held on said side surface of said visual-side substrate in such a manner that said illuminator is enclosed by a reflection type light source holder and end portions of said light source holder are bonded to end portions of upper and lower surfaces of

said visual-side substrate as an art-recognized means suitable for the intended purpose of comprising a lighted display (MPEP 2144.07).

Response to Arguments

10. Applicant's arguments filed on 31 October 2007 have been fully considered but they are not persuasive.

Applicant's ONLY substantive arguments are as follows:

- (1) The prior Final Rejection was not proper.
- (2) Regarding base claims, the applied prior art does not teach newly added limitations.
- (3) Dependent claims are allowable because they directly or indirectly depend from an allowable base claim.

Examiner's responses to Applicant's ONLY arguments are as follows:

(1) It is respectfully pointed out that all claims were drawn to the same invention claimed in the application prior to the entry of the submission under 37 CFR 1.114 and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the application prior to entry under 37 CFR 1.114. Accordingly, **THAT ACTION WAS MADE FINAL** even though it was a first action after the filing of a request for continued examination and the submission under 37 CFR

1.114. See MPEP § 706.07(b). Examiner has considered Applicant's arguments and maintains the Final Rejection mailed 29 June 2007 is proper.

(2) It is respectfully pointed out that the light guide, 3, is *inter alia* claimed as part of the visual-side substrate. The visual-side substrate is comprised of the light guide and the integral optical path control layer formed into its uppermost layer, the liquid crystal display panel comprises the visual-side substrate and the visual-side substrate comprises the transparent layer/substrate. A distinct optical path control layer is not considered patentably distinct from an optical path control layer that is integral to the transparent substrate [MPEP 2144.01 - 2144.05].

(3) It is respectfully pointed out that in so far as Applicant has not argued rejection(s) of the limitations of dependent claim(s), Applicant has acquiesced said rejection(s).

Any references cited but not applied are relevant to the instant Application.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy L. Rude whose telephone number is (571) 272-2301. The examiner can normally be reached on Mon-Thurs.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Nelms can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2871

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Timothy L Rude
Examiner
Art Unit 2871

tlr


1/19/08